Space Weather Forecast

Issued on Saturday, 21 January 2023 at 01:08 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Minor/Moderate Radio Blackouts likely. Slight chance of G1/Minor Geomagnetic Storms on Days 3 and 4 (23-24 Jan) due to a possible CME arrival.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low through the past 24 hours, with background common-class emissions. Two coronal mass ejections were observed on the 20th, one missing ahead of Earth, and a second, which looks like a faint halo CME, which has been analysed and shows a possible arrival at Earth on Day 3 (23 Jan). However, this is low confidence, with further analysis currently on-going. No other Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: Solar wind speeds were mainly ambient to slightly elevated levels. The Interplanetary Magnetic Field remained moderate, with the all important north-south component almost entirely positive with no prolonged negative deflections. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be Low to Moderate, with a slight chance of reaching High levels, with two large and complex sunspot regions on the visible disc, which are capable of producing significant flares.

Solar Wind / Geomagnetic Activity: Solar winds currently at background levels. A fast wind from a coronal hole was anticipated to arrive at Earth on the 20th or early on 21st, although there appears to be little evidence in the date for this feature.

A faint halo coronal mass ejection (CME) was observed in imagery early on the 20th Jan. This CME has been analysed and the results show a potential arrival at Earth on Day 3 (23 Jan). This is currently low confidence, with further analysis of this event on-going. The large straddling filament in the southwest quadrant lifted off the disc on the 20th Jan, which produced a CME. This has been analysed and shows a likely miss ahead of Earth, but there is a slight chance of a possible glancing blow from this CME, also on Day 3 (23 Jan), which may combine with the aforementioned CME.

Meanwhile, a fast wind from the next coronal hole, which is currently east of the solar meridian, is anticipated to arrive at Earth on Day 3 (23 Jan), which may combine with the aforementioned CME. This feature did not appear on previous rotation, therefore, is low confidence, with persistence offering little guidance.

Geomagnetic activity is expected to be initially Quiet to Unsettled, with slight chance of Active

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intervals through to Day 2 (22 Jan), possibly increasing to G1/Minor Storm on Days 3 and 4 (23-24 Jan) due to potential CME and fast wind arrival. This is low confidence.

Energetic Particles / Solar Radiation: Solar radiation will most likely remain at background levels, but with a slight chance of enhancements to S1 or greater through the period, in association with any larger flares.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	20	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	70	70	70	70
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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